

IN THE CLAIMS:

1. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream that is within predetermined pressure and temperature ranges, comprising the steps of:
 - (a) subjecting the inlet stream to fractional distillation providing a CO₂ bottom product stream and a distillation overhead stream;
 - (b) passing the distillation overhead stream to the inlet of a primary reflux drum producing a primary reflux liquid stream and a hydrocarbon vapor stream;
 - (c) subjecting the hydrocarbon vapor stream from step (b) to membrane separation to provide a hydrocarbon product stream and a permeate stream;
 - (d) compressing the permeate stream from step (c) to provide a compressed permeate stream; and
 - (e) recycling the compressed permeate stream from step (d) to said inlet of said primary reflux drum thereby providing a primary reflux liquid stream and a hydrocarbon gas product vapor stream.

2. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream according to claim 1 including:
 - passing said CO₂ bottom product stream from step (a) to a reboiler separator that provides a reboiler separator vapor stream directed to a bottom portion of said distillation column and a reboiler separator liquid stream.

3. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream according to claim 2 wherein said CO₂ bottom product stream from step (a) is pumped at increased pressure to said reboiler separator.
4. (Currently Amended) A method of separating CO₂ from a hydrocarbon gas inlet stream according to claim 1, 2 including the step of passing at least a portion of said reboiler separator liquid stream through a pressure reduction device to reduce the pressure thereof and adding heat thereto to provide a CO₂ gas product.
5. (Currently Amended) A method of separating CO₂ from a hydrocarbon gas inlet stream that is within predetermined pressure and temperature ranges comprising the steps of:
 - (a) subjecting the inlet stream to fractional distillation in a distillation column providing a CO₂ bottom product stream and a distillation overhead stream;
 - (b) subjecting said distillation overhead stream of step (a) to membrane separation, providing a hydrocarbon gas product stream and a permeate stream;
 - (c) compressing said permeate stream to provide a compressed permeate stream;and
 - (d) refluxing said compressed permeate stream from step (c) ~~back into said distillation column~~ through a primary reflux drum having a primary reflux liquid stream outlet in communication with said distillation column.
6. (Canceled)

7. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream according to claim 5, including between steps (c) and (d) the additional step of passing said compressed permeate stream through a secondary reflux drum.
8. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream according to claim 5 including:
 - subjecting at least a portion of said CO₂ bottom product stream from step (a) to reduced pressure to provide a CO₂ gas product.
9. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream according to claim 8 including the step of:
 - passing a portion of said CO₂ bottom product stream through a pressure reduction device through at least one heat exchanger used to adjust the temperature range of said hydrocarbon inlet stream.
10. (Original) A method of separating CO₂ from a hydrocarbon gas inlet stream that is within predetermined pressure and temperature ranges, including the steps of:
 - (a) subjecting the inlet stream to a distillation column producing a bottom product stream and a distillation overhead stream;
 - (b) condensing said distillation overhead stream of step (a) in a primary reflux drum producing a primary reflux liquid stream and a hydrocarbon vapor stream;
 - (c) recycling said primary reflux liquid stream of step (b) to said distillation column as a reflux stream;

(d) separating said concentrated hydrocarbon vapor stream from step (b) by membrane separation into a hydrocarbon gas product stream and a permeate stream;

(e) compressing said permeate gas stream from step (d) to produce a compressed permeate stream;

(f) condensing said compressed permeate stream of step (e) to produce a primary reflux liquid stream that is conveyed to an upper portion of said distillation column;

(g) pumping said bottom product stream from step (a) to provide an elevated pressure liquid CO₂ product; and

(h) subjecting said bottom product stream of step (a) to a reboiler separator to produce a CO₂ liquid product and a reboiler separator vapor stream that is recycled to a bottom portion of said distillation column.

11. (Original) A system for separating CO₂ from a hydrocarbon gas inlet stream that is within predetermined pressure and temperature ranges, comprising:

a distillation column receiving the hydrocarbon gas inlet stream and providing a CO₂ bottom product stream and a distillation overhead stream;

a primary reflux drum having an inlet receiving the distillation overhead stream and producing a primary reflux liquid stream and a hydrocarbon vapor stream;

a membrane unit receiving the hydrocarbon vapor stream from said primary reflux drum to provide a hydrocarbon gas product stream and a permeate stream;

a compressor receiving said permeate stream from said membrane unit to provide a compressed permeate stream; and

piping to recycle said compressed permeate stream to said inlet of said primary reflux drum thereby providing a liquefied CO₂ product and a hydrocarbon gas product.

12. (Original) A system of separating CO₂ from a hydrocarbon gas inlet stream according to claim 11 including:

 a reboiler separator having an inlet that receives said CO₂ bottom product stream from said distillation column and that provides a reboiler separator vapor stream to a bottom portion of said distillation column and a CO₂ liquid product.

13. (Original) A system for separating CO₂ from a hydrocarbon gas inlet stream according to claim 11 including;

 a CO₂ bottom product pump in line with said CO₂ bottom product stream to increase the pressure within said reboiler separator.

14. (Original) A system of separating CO₂ from a hydrocarbon gas inlet stream according to claim 11 including a primary refrigerant pressure reduction device through which at least a portion of said CO₂ liquid product from said reboiler separator is passed to reduce the pressure thereof and add heat thereto to provide a CO₂ gas product.

15. (Original) A system for separating CO₂ from a hydrocarbon gas inlet stream that is within prescribed pressure and temperature ranges comprising:

 a distillation column for receiving and fractionally distilling the hydrocarbon gas inlet stream providing a CO₂ liquid product and a distillation overhead stream;

a membrane unit receiving the distillation overhead stream and providing a hydrocarbon gas product and a permeate stream;

a compressor receiving the permeate stream and providing a compressed permeate stream; and

a primary reflux drum receiving said compressed permeate stream providing a primary reflux liquid stream that is refluxed back into said distillation column.

16. (Original) A system for separating CO₂ from a hydrocarbon stream according to claim 15 including a secondary reflux drum that receives said compressed permeate stream and that provides a secondary reflux liquid stream that is refluxed to said distillation column.
17. (Original) A system for separating CO₂ from a hydrocarbon stream according to claim 15 including a primary refrigerant pressure reduction device through which at least a portion of said CO₂ bottom product stream is passed to reduce the pressure thereof to provide a CO₂ gas product.
18. (Original) A system for separating CO₂ from a hydrocarbon inlet stream according to claim 17 including an inlet cross heat exchanger through which said CO₂ gas product from said refrigerant pressure reduction device passes and through which the hydrocarbon inlet stream passes to thereby serve to adjust the temperature range of the hydrocarbon inlet stream.